

CLAIMS

What is being claimed is:

1. A structure comprising:
a semiconductor light emitting device comprising a light emitting layer disposed between an n-type region and a p-type region, the light emitting layer configured to emit light of a first wavelength; and
a cerium-doped garnet phosphor having a cerium concentration between about 4 mol% and about 8 mol%.
2. The structure of claim 1 wherein the cerium-doped garnet phosphor has a cerium concentration of about 6 mol%.
3. The structure of claim 1 wherein the cerium-doped garnet phosphor is $(\text{Lu}_{1-x-y-a-b}\text{Y}_x\text{Gd}_y)_3(\text{Al}_{1-z}\text{Ga}_z)_5\text{O}_{12}:\text{Ce}_a\text{Pr}_b$ wherein $0 < x < 1$, $0 < y < 1$, $0 < z \leq 0.1$, $0 < a \leq 0.2$ and $0 < b \leq 0.1$.
4. The structure of claim 1 wherein the cerium-doped garnet phosphor is $\text{Y}_3\text{Al}_5\text{O}_{12}:\text{Ce}^{3+}$.
5. The structure of claim 1 wherein the cerium-doped garnet phosphor is disposed to absorb light of the first wavelength and capable of absorbing light of the first wavelength and emitting light of a second wavelength.
6. The structure of claim 5 wherein the first wavelength is blue and the second wavelength ranges from green to yellow.
7. The structure of claim 5 wherein the cerium-doped garnet phosphor is a first wavelength converting material, the structure further comprising a second wavelength-converting material, wherein the second wavelength-converting material is capable of absorbing light of one of the first wavelength and the second wavelength and emitting light of a third wavelength longer than the second wavelength.
8. The structure of claim 7 wherein the third wavelength is red.
9. The structure of claim 7 wherein the second wavelength converting material is one of $(\text{Ca}_{1-x}\text{Sr}_x)\text{S}:\text{Eu}^{2+}$ wherein $0 < x \leq 1$; $\text{CaS}:\text{Eu}^{2+}$; $\text{SrS}:\text{Eu}^{2+}$; $(\text{Sr}_{1-x-y}\text{Ba}_x\text{Ca}_y)_{2-z}\text{Si}_{5-a}\text{Al}_a\text{N}_{8-a}\text{O}_a:\text{Eu}^{2+}$ wherein $0 \leq a < 5$, $0 < x \leq 1$, $0 \leq y \leq 1$, and $0 < z \leq 1$; and $\text{Sr}_2\text{Si}_5\text{N}_8:\text{Eu}^{2+}$.
10. The structure of claim 1 wherein the semiconductor light emitting device is a III-nitride light emitting diode.
11. The structure of claim 1 wherein the cerium-doped garnet phosphor is coated on a top surface and a side surface of the light emitting device.

12. The structure of claim 1 further comprising:
a pair of leads electrically connected to the light emitting device; and
a lens disposed over the light emitting device.

13. The structure of claim 12 wherein the cerium-doped garnet phosphor is dispersed in an encapsulant disposed between the light emitting device and the lens.

14. The structure of claim 1 wherein the cerium-doped garnet phosphor is spaced apart from the light emitting device.